FOREST STEWARDSHIP PLAN

FOR

LAKE WAPELLO STATE PARK

Developed by:

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With assistance from the National Wild Turkey Federation Biologist
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How this forest stewardship plan was developed:

The Iowa Department of Natural Resources (IDNR) Forestry Bureau was awarded a Northeastern Area State and Private Forestry Competitive Grant for the Soap Creek Watershed in Southeast Iowa in 2008. The grant is to focus on landscape level management across public and private sector property boundaries in the Soap Creek Watershed. The emphasis is on the Davis and Appanoose County portions of the watershed but can reach into the neighboring counties. The main purpose is to integrate forest management between the IDNR Forestry, Wildlife, and Parks Bureaus forested land (4,101 acres) and reach out to the surrounding private lands consisting of 17,113 acres.

The Lake Wapello State Park is located in Davis County and is within the Soap Creek Watershed boundaries. Lake Wapello is managed by the IDNR Parks Manager Ron Moore and Park Ranger Chad Horn. As managers of the park, they are responsible for determining the objectives of the park and insuring proper management. There is a cooperative effort by the Parks Bureau to work closely with the Forestry and Wildlife Bureaus in overall management of the park to enhance the area's vast forest, wildlife, and recreational diversity.

The park has been walked to determine forest stands by tree species, tree size, topography, and management system. The park managers, foresters, and wildlife biologist discussed options for each stand on a micro and macro level for the entire park. The forester recommendations are designed to manage the stand to reach the goals and objective of the park managers.

Each stand will have a management system specified. There are two management systems used to provide a guide to future forest management. The two systems are Even Age and Viewshed and are described in more detail in the plan, but a brief description is below.

Even Age-

Shade intolerant tree species such as oak and walnut require full sunlight to grow. Even age management involves a clearcut at some point to create the full sunlight condition. Even age stands are clearcut every 125 years. Clearcutting also creates early successional habitat for the first 10-15 years following the harvest.

Viewshed-

These areas are highly visible or do not require active management.

July 28, 2009

Forest Stewardship Plan

For
Lake Wapello State Park

Managers: Chad Horn Park Ranger
Ron Moore Park Manger

Telephone: (641) 722-3371

Location: 15248 Campground Road
Drakesville, IA 52552

Total Acres: 1,150 acres park total
835 acres forested land
289 acres lake
26 acres campground / offices / other land

Introduction:

The IDNR is the state government agency that leads Iowans in caring for their natural resources. It is responsible for maintaining state parks and forests, protecting the environment, and managing energy, fish, wildlife, land and water resources in Iowa. As part of our responsibility of managing we must work together as an agency to insure our state parks and forests are healthy and provide the best habitat for our wildlife. Another responsibility is to insure that Iowans are provided natural areas that will improve the quality of life and assure a legacy for future generations.

The best way to ensure that our natural resources will be available for the future is to have a Forest Stewardship Plan (FSP). The expertise of IDNR employees is utilized to insure all aspects of the forest will be taken into consideration and managed properly. There are is a diverse array of indigenous and migratory wildlife species in the state. Many of the species live in our state parks and forests or use the state lands during migration or periods of dispersal. The forest itself is a slow evolving system, with most of the trees reaching maturity after 100 years. This slow change emphasizes the need for a FSP to wisely manage the forest resource over such a long period of time.

There are 4 primary factors emphasizing the need for FSP's for state lands:

1. To slow forest fragmentation and increase sustainable management of Iowa's forests to enhance public benefits derived from forest related resources for present and future generations
2. To maintain the health and vitality of forest ecosystems at risk from potentially damaging agents.

3. To protect and enhance the health of watersheds.
4. To promote public support for sustainably managed forests by building credibility and trust with partners, cooperators and stakeholders.

Description of Area

Lake Wapello's 1,150 acres could easily be called the "country club" of Iowa's state parks. The beautiful wooded hillsides, shaded picnic areas and lake provide a quiet elegance which makes Lake Wapello one of southern Iowa's best-kept secrets. The main goal of the Parks Bureau is to provide a place of recreation for the public. Lake Wapello State Park has camping, cabins, lodge with a restaurant, trails for hiking and cross country skiing, and all the water sports available in a 289 acre lake. In 2008 the lake was drawn down for renovations and should be completed in 2009.

The non lake (non-aquatic or upland) areas with trees in the park have been divided into 61 different areas or stands shown on the photo (Appendix.) Each stand is described in this plan and recommendations are outlined for woodland management. A priority level has been established for each stand to assist in management decisions.

Wildlife

Lake Wapello State Park will be managed for a diversity of wildlife species by utilizing various forestry techniques. Wildlife species at the forest include, but are not limited to: deer, turkey, bobcat, squirrel, rabbit, red fox, quail, pheasant and many songbirds. The Iowa DNR Wildlife Bureau will provide guidance and assistance in understanding the needs of Iowa's wildlife in the park. The Iowa Wildlife Action Plan will be utilized to examine how forest management can benefit Iowa's wildlife, particularly the identified Species of Greatest Conservation Need (SGCN) and listed threatened and endangered species. The Iowa Wildlife Action Plan can be accessed online at: http://www.iowadnr.gov/wildlife/diversity/plan.html.

See Appendix for information on threatened and endangered species.

Development of a diverse forest will benefit the largest number of wildlife species. Forest stand improvement practices will benefit many wildlife species by improving forest health and increasing mast production of individual trees which are valuable food sources. Timber harvesting and regeneration will benefit species by providing new and healthy forest stands for sustainable habitat, encouraging oak ecosystems and creating early successional habitat. Grassland species will benefit from continued prescribed fire and brush management in grassland areas.

Objectives:

The primary objective for the park is to provide recreational opportunities for the public. Secondary objectives include habitat for wildlife and forest management.

Income from Timber Harvest:

Harvesting is conducted to regenerate stands to desirable species and to achieve a desirable diversity of tree sizes and species. Income from timber harvesting operations should be reinvested into the area to plant trees, thin young stands, and convert areas to more desirable species. Without this reinvestment, there is little chance that the Park's annual budget will allow the recommendations in this plan can to be implemented. Harvesting is a very minimal portion of this plan. The majority of work recommended is directed at thinning young stands so the oak is not shaded by other trees, removing undesirable species to encourage natural regeneration of desirable trees, and tree planting needed.

Current Distribution of the Tree Size on the area:

The woodland was stand mapped according to the average tree size as follows-

Tree Size	Acres	Percent of Total Area
Pole (5-12" dbh)	293	37
Medium (14-18" dbh)	316	40
Large (>20" dbh)	183	23
Totals	792	100

Proposed Management Systems for the area:

Recommendations for each stand were based on whether the area will be managed to create an even age system or as a viewshed. The decision on what system would be used was based on the objectives for the area to maintain an oak component where feasible, develop a diverse woodland landscape, protect fragile sites, and improve water quality in the lake.

The management recommendations for Lake Wapello State Park are shown in the table below-

Management System	Acres	% of Total Area
Even Age	391	47
View Shed	444	53
Total	835	100

Even Age Management:

Even age management is essential for oak and hickory forests. Even age management involves growing a stand of trees which are close to the same age. At some point in the stands life, the area is clearcut, which creates the even age structure. Even age management creates excellent habitat for deer, turkey, and a diverse group of other game and non-game wildlife species, and is essential for regeneration of oak which require full sunlight. The only way that oak can be maintained as a component of the forest is by practicing some form of even age management.

While there are many methods to open up a stand, clearcutting and shelterwood harvesting are the most common. Clearcutting is a practice that opens the stand all at once. One important factor before clearcutting is to insure a seed source is either on the ground or can enter from the surrounding trees. Often times planting is necessary to create an oak forest when after clearcutting.

Shelterwood harvests include several thinnings done prior to the final clearcutting. If the shelterwood is done correctly, the trees left after the thinnings will provide seed and the forest will be open enough to allow sunlight to reach the forest floor. The trees left will also help provide shade that limits the growth of undesirable or invasive plant species. Once the next generation of oaks reach 3-5 feet in height, the area will be ready to be clear cut. This method can take many years to create the next oak stand and may need mechanical or fire disturbance keep out undesirable species.

Clearcutting to create full sunlight is essential at some point in the stand's life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species such as ironwood, maple, bitternut hickory, and elm. Clearcuts also provide habitat for early successional wildlife species. The area is very brushy for a period of years, and is highly utilized for foraging, nesting, brood rearing, and escape cover. Because it takes active management to create early successional habitat, it is generally one of the more lacking habitat types. After 10 to 15 years the stand of oaks will shade out the ground and the stand will be in entering the pole sized stage.

Crop tree release is discussed in this plan. This practice is done most frequently when the trees are pole sized. The goal of the practice is to choose no more than 50 trees per acre that are considered to have the best genetics. These trees are typically tallied and marked with paint, and then the trees that touch the canopy of the crop tree are killed to allow the tree to reach maximum growth potential.

Thinning the understory is a practice also used in even age management. This practice involves removing trees that are below the main canopy to allow more sun light to get to the forest floor. Ironwood, sugar maple, and other shade tolerant species warrant this practice if species like oak are wanted in the future.

Fire is an affective and inexpensive tool that has a long history of use and continues to be studied in managing oak stands. Occasional burning of the leaf layer in the woods will kill thin barked species such as hard maple, cherry, elm, bitternut hickory and iron wood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Depending on the extent of root system development, some oak seedlings will tolerate fire better than others, but as a whole, oaks tolerate fire better than other tree species. The top of an oak seedling often will die back following fire, but the roots will send up new growth soon thereafter.

There will be 391 acres of even age management to regenerate oaks.

Viewshed management:

Viewsheds are typically areas that have been opened for prairie or cedar patches, picnic areas, campgrounds, and other building sites. Areas that have been designated to have endangered plant or animal species will also fall under the viewshed management (currently no such areas have been determined.) Management can take place on these areas but is generally less aggressive and of lower impact to the landscape than other areas in the park.

Viewshed management is designated for 444 acres.

Early Successional Management:

Many plants, animals, and birds depend on early stages of woody growth. Mowing off woody growth every 15 to 20 years will allow for this early stage of plant growth and not allow the trees to shade out the understory. One important aspect of early successional management is to not have straight line edges. Feathering the edges will make a gradual transition from the field edge to the larger trees. Areas that are near roadsides, parking areas, prairies, camping, cabins, and other open areas will be suitable for early successional management.

Invasive Species:

Lake Wapello has invasive species in the park. Some of these species include black locust, multi-flora rose, and honey suckle. Insuring that these species are controlled and are not taking over the park and surrounding land is important. Other things to watch for in the forest include bag worm, oak wilt, Tabakia, garlic mustard, emerald ash borer, sudden oak death, and oak tatters. If any of the aforementioned are found or thought to be in the park, please notify the proper agencies as soon as possible.

Treating the invasive species in the park can prove difficult but not impossible. Black locust is a species that is very difficult to treat because it does not always respond to typical methods of control. One method that has been shown to work in Shimek State Forest is to first cut the tree down when it is dormant (winter months) and treat the stump with Tordon® then the next growing season treat all of the stump sprouts with Crossbow®, a chemical that only affects woody plants. Multi-flora rose and honey suckle can be greatly impacted by fire. Honey suckle can be cut down and treated with Glyphosate (Roundup®) or Tordon®. As with all chemicals, care should be taken to follow all labels instructions and proper procedures.

Soils

The bottom land has Olmitz-Vesser-Zook Complex and Nodaway-Lawson-Ackmore soils. Typically these soils are fertile but tend to flood.

The side slopes mainly are comprised of Lindley soils. The Lindley series consists of very deep, well drained, moderately slowly permeable soils. They formed in glacial till and may have a thin mantle of loess. These soils are good for oak/hickory stands

The ridge tops are a mix of Kiswick and Weller. The Weller series consists of deep, moderately well drained, slowly permeable soils formed in loess on uplands. The Keswick series consists of very deep, somewhat poorly drained soils formed in 25 to 50 centimeters of loess or loamy sediments. Both soil's native vegetation is deciduous trees.

WORK PLAN

FOR LAKE

WAPELLO

STATE PARK

The work plan for Lake Wapello State Park is designed to aid park officials and foresters in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. Every detail has not been outlined in the plan because the plan would become too long to be of practical use. This plan is intended to get work accomplished on the ground.

DESCRIPTION AND RECOMMENDATIONS FOR INDIVIDUAL STANDS

Stand 1: 14 acres

Site Description:

This stand is a southwest facing slope on the bottomland. It surrounds a former fish stocking pond.

Woodland Description:

Black locust, honey locust, white oak, bur oak, shingle oak, eastern red cedar, and a few black walnuts are the main species in this stand. Most of the trees are medium sized (8-16" DBH) with a scattering of wolf bur and white oaks. Hackberry and elm are in the understory along with some multiflora rose.

Management Recommendations: Even age

This stand would benefit from a weed tree removal, killing unwanted tree species. A reevaluation of the stand should occur in 10 to 15 years. Fire would help this stand reduce unwanted trees and with oak regeneration.

Wildlife management recommendations:

The open area adjacent to Stand 1 where the fish rearing ponds once existed has potential to be managed for Bobwhite quail and other early successional bird species. Exterminating the non-native, cool season grasses and establishing native warm-season species suitable for the site would be beneficial. Other practices such as small grain food plots, strip disking, and feathering of the woodland edges would also enhance this area for quail. Prescribed fire would serve as a good management tool once the site is established.

Stand 2: 83 acres

Site Description:

This stand is mostly north facing slope with some ridge top on the very southern edge. Three new retention ponds were being constructed within the stand in 2009.

Woodland Description:

Most of the trees in this stand are white oak, red oak, black oak, and a few bur oaks. Most of the trees are medium size (12-18" DBH.) The understory is hackberry, ash, bitternut hickory, elm, and hazelnut.

Management Recommendations: Even age

This stand would benefit from an understory thin to remove trees that are hampering oak regeneration. A harvest could begin within the next 15 to 20 years and consist of 5-10 acre clear cuts to promote regeneration from the seed source provided by surrounding trees. The trees in the draws are larger and therefore should be the first removed.

Wildlife habitat:

This stand contains is one of the larger tracts of forestland in the park and is contiguous with a significant tract of privately owned forestland. It represents an important habitat area for wildlife that utilize large, unbroken tracts of forested land. Management practices that maintain the continuity, while minimizing fragmentation within both the private and public ownership of this area will greatly benefit these wildlife species. Additionally, a more consistent acorn crop might be produced in this stand if management practices favored the less prominent red oak.

Stand 3: 8.9 acres

Site Description:

This stand is on a west, northwest facing slope. It is just down the hill from Smith Knoll Shelter.

Stand Description:

Bur oak, shingle oak, and shagbark hickory that are pole sized (5-10" DBH) and hackberry, elm, shagbark hickory, and cedar occupy the understory.

Management Recommendations: Even age

The bur oak would benefit form crop tree release to help them grow within the next 15-20 years. Once the trees reach merchantable size, a shelterwood harvest would be the best option due to the closeness of the picnic shelter.

Wildlife management recommendations:

If trees are felled during the crop tree release activities, tree tops should be left on the ground or loosely formed into brush piles. These piles will provide nesting, loafing, and escape cover for wildlife. Trees that are girdled during this process will slowly die and decay (become snags) and be used by birds and squirrels as nest cavities. Birds will also feed on the abundant insects found in dead trees.

Stand 4: 2.7 acres

Site Description:

This stand is southwest facing and mostly ridge top. The stand is next to the road and parking area for the shelter.

Stand Description:

Eastern red cedar, a few very large bur and white oaks, and scattered white pine make up this stand. Most of the trees are in the pole sized stage (5-10" DBH), with the exception of the couple of wolf oaks on the edge. Where the area has not been mowed, young shingle oaks and a few white and bur oaks are moving in.

Management Recommendations: Viewshed

Since this stand is close to a recreational area, including a shelter and parking area, it could benefit from mowing and removing some of the edge every few years. Maintaining a feathered edge would benefit wildlife by creating an early successional habitat type that transition from the open space to the mature forest.

Stand 5: 2.7 acres

Site Description:

This stand is on the bottomland with no slope, a small stream runs through the site and a catch pond is on the northeastern edge.

Stand Description:

The main species in the stand are hackberry, silver maple and honey locust and most are of a pole size (5-10" DBH.) The understory has some walnut, elm, silver maple, shingle oak, and shagbark hickory. Little regeneration was found.

Management Recommendations: Viewshed

Because of the diversity of this stand, limited management should be done. Future work may include picking 10-15 trees per acre to be managed as crop trees.

Wildlife management recommendations:

Crop tree preference should most commonly be mast producers; with hard mast (oaks) being the first preference and soft mast producers, such as black cherry and hackberry a second preference. In certain situations, non-mast producing trees may be selected as crop trees when there is an obvious need to increase species diversity in a stand.

Stand 6: 2.3 acres

Site Description:

This site has a southeastern slope on a slight hill side.

Stand Description:

This stand is almost all eastern red cedar with a few shingle oak and a couple of walnuts that are all pole (5-10") sized. There are a few young shingle oak and cedar in the stand where light is reaching the ground.

Management Recommendations: Viewshed

This stand has been designated to be converted to prairie by Lake Wapello staff.

Wildlife management recommendations:

If it fits with the plans to establish prairie, consideration should be given to retaining clumps of the red cedar. These trees provide thermal protection for wildlife during inclement weather. Such clumps should be located in a manner to be free from prescribed fires used in the future to manage the prairie.

Stand 7: 14.2 acres

Site Description:

This stand has both north and west facing slopes and is mostly side slopes and bottomlands.

Stand Description:

Black locust, honey locust, shingle oak, silver maple, and scattered red and white oaks make up this stand. Most of the trees are medium sized (12-18" DBH.) The understory includes hackberry, shagbark hickory, elm, ironwood, and ash, with some regeneration of shagbark hickory and silver maple.

Management Recommendations: Viewshed

This stand is highly visible from the lodge, hiking trail, and private campground so a minimal amount of disturbance is recommended. However, crop tree release could be implemented on 10-15 trees per acre, and black locust could be removed and properly stump treated.

Wildlife management recommendations:

In the process of weed tree removal or crop tree release, it is advisable to leave 6-7 den trees (live trees with cavities) per acre. Ideally these trees would be of various diameter, ranging from 20"+, 10"-20", and 6"-7". These trees provide important nesting and denning sites for birds and mammals.

Stand 8: 1.08 acres

Site Description:

This stand is on the ridge top and is north facing.

Stand Description:

White oak, red oak, and shagbark hickory that are medium sized (12-18") are in this stand.

Management Recommendations: Even age

This stand would benefit from removing or thinning the understory to promote regeneration of the oaks. Within 25 years a shelterwood harvest could occur.

Stand 9: 5.3 acres

Site Description:

The stand is a west facing side slope.

Stand Description:

Medium sized (12-18") bur oak, shingle oak, and black locust make up the overstory of the stand. The understory has cherry, elm, ironwood, bitternut hickory, and black locust, with the regeneration mostly being bitternut hickory.

Management Recommendations: Viewshed

This stand has hiking trails leading to the private campground. If care is taken to insure the black locust will not regenerate, this stand could use a weed tree removal.

Stand 10: 6.9 acres

Site Description:

This site is a north facing slope. A retention pond is planned near the southern border of the stand.

Stand Description:

Red oak, black oak, white oak and shagbark hickory of large trees (18"+ dbh) make up this stand. The understory has a few shagbark and white oak that are suppressed. A few bitternut hickory, shagbark hickory, cherry, and ash trees are regenerating.

Management Recommendations: Even age

The stand would benefit from a shelterwood harvest. The trees are large enough that an initial cut through the stand should provide adequate seed source.

Wildlife management recommendations:

The Great blue heron rookery located in the retention pond adjacent to stand 10 is a valuable wildlife resource. It is recommended that several large trees be protected within this stand to serve as possible replacement and/or expansion nesting sites for these birds. Disturbance during the nesting and brood rearing period (beginning in mid-March) should be minimized. It is also recommended that the retention pond maintain a lower water level (18") if possible. A lower water level would allow the growth of more emergent plants, resulting in more invertebrate food sources for the herons.

Stand 11: 7.5 acres

Site description:

This site is on a bottomland and has little to no slope.

Stand Description:

Medium trees (12-18" dbh) of cottonwood, shingle oak, and silver maple make up the overstory. The understory has elm, shingle oak, cottonwood, and a few cherry trees.

Management Recommendations: Even age

Trees could be harvested out of this stand by a shelterwood harvest in about 20 years. The quality of the trees is not very high and could be combined with another stand near by to ensure sale. Because of little regeneration possibilities from higher valued trees, planting may be necessary.

Stand 12: 52.2 acres

Site Description:

This site has some ridge top but mainly has west, north and east facing slopes. There will be two retention ponds installed in this stand.

Stand Description:

The stands has white oak, red oak, black oak and some scattered bur and shingle oaks all of pole (5-12" dbh) size. The understory has a few shagbark hickory and cherry.

Management Recommendations: Even age

This stand would benefit from a crop tree release within the next 10 years. Once the trees reach maturity small clearcuts should be done to regenerate the oaks.

Wildlife management recommendations:

Both the crop tree release prescribed in 10 years and the small clear cuts recommended when the trees reach maturity can be beneficial for wildlife. The crop tree release will favor the crown development and acorn production of the oaks. Some consideration should be given to favoring red and black oaks during this process since these trees are less dominant than white oak. A more dependable acorn crop can be expected as a result. It is also recommended to leave several large roost trees in the draws and ravines of this stand during future clear cutting operations. The outer edge of this stand could also be enhanced for early successional wildlife by edge feathering.

Stand 13: 17.2 acres

Site Description:

This site is mainly a northwest facing slope. A retention pond is planned in this site.

Stand Description:

White oak with a few scattered red and black oaks of pole sized timber (5-10" dbh) make up the over story. There is some elm and ironwood in the understory.

Management Recommendations: Even age

The stand should have a crop tree release with in the next 10 years. A shelterwood harvest will be the best for this stand since white oak is predominate if red and black oak are desirable in the future.

Stand 14: .07 acres

Site Description:

This site is an open area where a stream from a privately owned pond discharge flows. A retention pond will be installed here.

Stand 15: 22.4 acres

Site Description:

Most of this stand is northwest facing slope.

Stand Description:

Most of the trees in this stand are pole sized (5-10" dbh) white oak, with a few black, red, bur and shingle oaks also present. The understory is elm, shagbark, and prickly ash.

Management Recommendations: Even age

The stand needs crop tree release within the next 15 to 20 years. Once the trees reach maturity a shelterwood harvest should be done.

Stand 16: 3.05 acres

Site Description:

The site is a southwest facing slope.

Stand Description:

This stand is mostly shagbark hickory, with a few scattered pole sized (5-10"dbh) bur oak. The understory has a few hackberry and shagbark hickories.

Management Recommendations: Viewshed

This stand would benefit with a thin to reduce the amount of shagbark hickory and promote the oaks. A basal area thin could be used. A basal area thin is based on number of trees per acre currently and reducing the number of trees to what the land can sustain. Currently the stand has about 300 trees per acre and should be reduced to 150 to 200 trees per acre.

Wildlife management recommendations:

Although the thinning recommended above will benefit the production of the stand, for wildlife habitat diversity considerations, a more extensive thinning could be considered. Thinning to 50-75 trees per acre will result in a more open canopy and greater development of herbaceous ground cover. Sites such as this are rich with insects and provide valuable brood rearing habitat for wild turkey and other birds.

Stand 17: 2.13 acres

Site Description:

This site is north facing and is on a side slope.

Stand Description:

This stand has medium sized (12-18" dbh) shagbark hickory, black oak, red oak, and a few scattered walnut, basswood, and white oak. The understory is comprised of shagbark hickory with a few forbs and ironwood seedlings.

Management Recommendations: Even age

Crop tree release would be beneficial for the oaks and walnut in the stand. This stand could be harvested in the next 20-30 years with a shelterwood being the method of choice.

Stand 18: 12.2 acres

Site Description:
This site is on a northwest facing slope.

Stand Description:
This stand is made up medium sized (10-18" dbh) bur oak , black oak, red oak, shingle oak, black locust, shagbark hickory, and some bitternut hickory. In the understory there are shagbark hickory, cherry, and bitternut hickory. The only trees regenerating are ash and bitternut.

Management Recommendations: Even age
This stand could use a crop tree release to encourage growth. A shelterwood harvest would ensure that most of the more desired oaks will regenerate. There are a couple of nice roost trees in the stand that could be left for wildlife purposes.
Since the only regeneration occurring in this stand is ash and bitternut hickory, the use of prescribed fire might be appropriate. A slow moving fire with minimal heat intensity could affectively kill the ash and bitternut and open the site to better oak regeneration.

Stand 19: 22.9 acres

Site Description:
This site is primarily north facing side slope with two old CCC buildings. There is a new water retention pond in the stand and another to be completed during 2009-2010.

Stand Description:
Most of the trees in the stand are large (20+" dbh) and are mainly white oak, red oak, and black oak, with a few scattered shagbark hickory around. In the understory is ironwood with some hazelnut.

Management Recommendations: Even age
This stand needs to have a shelterwood harvest or have a 5 acre clearcut done every 5 to 10 years. It would also benefit to have the ironwood removed to insure regeneration of the oaks.

Stand 20: 8.1 acres

Site Description:
This site is the Smith Knoll Shelter with parking area and a CCC shelter building.

Stand Description:
There is a stand of white pine and a few scattered red cedars around the shelter.

Management Recommendations: Viewshed
The white pine could be thinned to insure growth and to limit disease problems.

Stand 21: 6.7 acres

Site Description:
The site is mainly west facing and has a little ridge top but is mostly side slope.

Stand Descriptions:
Most of the trees are medium sized (12-18" dbh) white oak, red oak, black oak, and shagbark hickory.

Management Recommendations: Even age
An understory thin would help these trees with regeneration. Harvesting these trees could take place within 25 to 35 years. A clearcut or shelterwood would work in this area due to the seed source provided by the surrounding oaks.

Stand 22: 8.1 acres

Site Description:
This site is northwest facing and is a side slope with a little ridge top.

Stand Descriptions:
Most of the trees are large sized (20"+ dbh) and are white oak with a few bur oak. There are a few scattered shagbark hickory, ironwood, and cherry in the understory and in places where light reaches the ground a few white oaks have regenerated.

Management Recommendations: Even age
Harvesting this stand should be done within the next 10 years. A clearcut would work here because the surrounding forest would provide adequate seed. Reducing the understory one to two years before the harvest would help promote oak regeneration.

Stand 23: 6.3 acres

Site Description:
This site is north facing and is a side slope that goes into a bottomland.

Stand Description:
The trees in the stand are pole sized (5-10" dbh) and are primarily shagbark hickory, with lesser amounts of white and red oaks. There is some ironwood coming into the stand.

Management Recommendations: Even age
This stand needs to have crop tree release within the next 5 years to open up for the few oaks present. Because of the amount of hickory in the stand, it may need to be reevaluated 10 years after the crop tree release to insure good growth.

Stand 24: 8.4 acres

Site Description:
This site is mainly north facing and has several streams running to the bottom ground. This stand shows signs of past grazing activity.

Stand Description:

Most of the trees in this stand are large sized (20"+ dbh) and are white oak, red oak, and black oak. There are some shagbark hickories in the under story and a few white oak and shagbark hickory regenerating.

Management Recommendations: Even age

This stand should have a shelterwood harvest done within the next 15 to 20 years to begin regeneration of oaks.

Stand 25: 24.2 acres

Site Description:

This site is bottomland with little to no slope and a large stream running in the middle.

Stand Description:

Most of the trees in this stand are medium sized (10-18" dbh) and consist of a variety of bottomland species including ash, hackberry, cottonwood, black walnut, and some locust (both black and honey.)

Management Recommendations: Viewshed

This stand is next to the highway and entrance of the park. Weed tree removal is recommended to reduce the amount of undesirable species.

Stand 26: 6.3 acres

Site Description:

This site is mostly north facing on a side slope and adjacent to the dam of the lake and a parking area.

Stand Description:

This stand is mainly pole sized (5-10" dbh) shagbark hickory, with some white oak, shingle oak, and hackberry. There are a few cherry and elm coming up in the understory.

Management Recommendations: Even age

Crop tree release is needed to open the stand and provide room for growth for the few oaks present. This should be completed in 20-25 years. Because this stand is near a high public use area, it could serve as a demonstration site for timber stand improvement practices. Signage could be posted that provides the visiting public information describing the purpose and process of TSI.

Stand 27: 13.5 acres

Site Description:

This site is mainly south facing and bottomland with a stream running through it.

Stand Description:

The trees in this stand are pole sized (5-10” dbh) and consist of bur oak, black locust, hackberry, ash, silver maple, and a few swamp white oaks. In the understory are ash, hackberry, cedar, and shingle oak and an abundance of multiflora rose.

Management Recommendations: Viewshed

Since this stand is adjacent to the road and highly visible to the public, management should be limited to black locust removal.

Stand 28: 25.1 acres

Site Description:

This site is southeast facing and is mostly a side slope.

Stand Description:

Most of the trees in this stand are pole (5-8” dbh) sized black locust with a few cedar, bur oak, shingle oak, black walnut, ash, and cherry. There are a few trees in the understory including cherry, shingle oak, red bud, ash, black locust, and honey locust.

Management Recommendations: Viewshed

This stand is dense with black locust and needs to have the population reduced. Since the site is visible to the public, care should be taken to accomplish this. A series of relatively small thinnings over a 3-4 year period would result in the gradual removal of the locust. As the black locust is controlled, plantings may be necessary to repopulate with other species.

Stand 29: 2.2 acres

Site Description:

Most of this stand is ridge top with a little southeast facing slope.

Stand Description:

The trees in this stand are pole sized (4-8” dbh) and mostly are cedar but a few shingle oak, ash, and honey locust are scattered around.

Management Recommendations: Viewshed

This stand does not need any work and is a visual barrier to the septic ponds for the park.

Stand 30: 2.1 acres

Site Description:

Most of this stand is bottomland surrounding a stream but there is some side slope that faces southwest. On the north border is a planned retention pond.

Stand Description:

This stand is made up of medium sized (12-18" dbh) black walnut, cottonwood, black oak, and hackberry. In the understory there are elms, cedar, ash, and a few sugar maples.

Management Recommendations: Viewshed

This stand could be thinned to help the few walnut and oaks. This site should be reevaluated in 10 to 15 years.

Stand 31: 4.6 acres

Site Description:

This stand is on a northeastern facing slope.

Stand Description:

Red oak, black oak, shingle oak, shagbark hickory, basswood, and a few black walnuts dominate the site. The understory has hackberry and elm, with no regeneration of oaks or walnut.

Management Recommendations: Even age

Crop tree release should be done in this stand to open it up for better growth. A shelterwood harvest could begin in as few as 30 years.

Stand 32: 3.1 acres

Site Description:

This stand is mostly ridge top with some southwestern side slope.

Stand Description:

This stand is pole sized (5-10" dbh) shingle oak and cedar with a few honey locust. The understory has some hackberry and elm.

Management Recommendations: Viewshed

This stand has no trees of commercial value, but has wildlife value. This stand could be thinned to open it up more to increase new growth of seedlings and forbs to increase wildlife food sources.

Wildlife management recommendations:

During the thinning process mentioned above, snag and den trees should be left if any exist. The thinning should favor mast-producing trees (both hard and soft). Thinning

for wildlife benefit should be more extensive then for lumber production. Thinning trees to as much as a 30'x30' spacing enhances the growth and diversity forbs. Trees cut in this process should be loosely placed into brush piles to provide escape cover for wildlife.

Stand 33: 3.1 acres

Site Description:

This stand is a southeast facing drainage area that has plans for the construction of a retention pond.

Stand Description:

Single oak, black walnut, ash, and hackberry that are medium sized (12-18" dbh) make up the overstory of this stand. The understory is cherry, bitternut hickory, hackberry, and elm with some bitternut and elm regenerating.

Management Recommendations: Even age

The walnut could use help of a crop tree release. A harvest may be possible in 20 to 30 years.

Stand 34: .8 acres

Site Description:

This site is a 20 foot deep section of timber in front of a private residence. No management will be needed work unless it is overtaken by undesirable species.

Stand 35: 5.1 acres

Site Description:

This site is a ridge top with some southeast facing slopes. On the west side of the stand is a camp ground.

Stand Description:

Black locust, ash, cottonwood, black walnut, and scattered white oak and silver maple that are medium sized (12-18" dbh) make up the tree species in the overstory. The understory has hackberry, black locust, and cedar.

Management Recommendations: Viewshed

A weed tree removal should to be done on this stand to eliminate some of the black locust.

Stand 36: 21.1 acres

Site Description:

This site is a drainage area that is south facing. On one side is a camp ground and the other side has cabins. A retention pond will be installed in this site.

Stand Description:

The overstory in the stand has ash, shingle oak, some pockets of black locust, and scattered bur and white oak that are medium (12-18" dbh) sized. The understory is black locust and elm.

Management Recommendations: Viewshed

A weed tree removal could to be done on this stand to control the locust.

Stand 37: 11.1 acres

Site Description:

This site is a drainage area that is south, southwest facing. On the west side are cabins and on the northeast is the lodge and parking area.

Stand Description:

This stand has silver maple, white oak, shingle oak, some black walnut, and swamp white oak all of medium to large size (18-20".)

Management Recommendations: Viewshed

This stand could be thinned and should be reevaluated in the next 15 years.

Stand 38: 10.7 acres

Site Description:

The area is on a southeastern slope with an old cabin located in the middle and the lodge with parking on the south.

Stand Description:

This stand is pole sized (5-10" dbh) with hackberry, shingle oak, bur oak, shagbark hickory, cedar, and black locust. In the understory is redbud, bitternut hickory and black locust. Some bitternut is regenerating.

Management Recommendations: Viewshed

This site could use a crop tree release (10-15 trees an acre) to help promote oak regeneration.

Stand 39: 3.5 acres

Site Description:

This site is mostly southeast facing side slope that has the lake, the lodge, and a road surrounding it.

Stand Description:

Most of the trees in this stand are large (20+") sized and mostly sycamore, with some bitternut hickory, shingle oak, and honey locust. There are some cherry, bitternut hickory, and honey locust in the understory.

Management Recommendations: Viewshed

If any work is to be done here it would be a weed tree removal to get rid of the undesirables.

Stand 40: 3.7 acres

Site Description:

This site is southeast facing side slope that is bordering the lake.

Stand Description:

The medium sized (12-18" dbh) trees that make up this stand are shingle oak, honey locust, shagbark hickory and basswood. In the understory are cherry, shingle oak, and hackberry.

Management Recommendations: Viewshed

This stand could use weed tree removal to get rid of the locust.

Stand 41: 6.7 acres

Site Description:

The site is on a side slope that borders the lake and is southwestern facing.

Stand Description:

Most of the trees are medium sized (12-18" dbh) basswood, black walnut, swamp white oak, ash, and shagbark hickory. In the understory is elm and cedar.

Management Recommendations: Even age

Crop tree release would benefit the walnut in this stand. A shelterwood harvest could be done in 30-40 years.

Stand 42: 26.7 acres

Site Description:

This site is mainly southeastern facing side slope that borders the lake and has a shelter area on the eastern side.

Stand Description:

The pole sized (5-12" dbh) trees that are in this stand are cedar, black locust, cherry, elm, ash, with some larger shingle oak, bitternut hickory, and elm scattered throughout. There is a lot of bitternut hickory regenerating.

Management Recommendations: Viewshed

Weed tree removal could be done to eliminate the non-native and highly competitive black locust. Park management plans call for converting the areas occupied by cedars to native prairie.

Stand 43: 48.3 acres

Site Description:

This site is Northeast facing slope that borders the lake.

Stand Description:

White Oak, Red Oak, Black Oak, and Shagbark Hickory make up the overstory, most of which are large (20+" dbh) sized. The understory has some shagbark hickory and elm.

Management Recommendations: Even age

This stand is ready to begin a shelterwood harvest or spot clear cuts within the next 10 years.

Stand 44: 36.4 acres

Site Description:

This site is a side slope that is mainly south southeast facing. During the 2009-2010 winter a retention pond will be installed in this stand.

Stand Description:

This stand is full of pole (5-10" dbh) black locust and shingle oaks, with a few white oak, red oak, and black walnut. Most of the understory is black locust, shingle oak, elm, hackberry, and cherry.

Management Recommendations: Viewshed

The black locust should be watched and controlled if spreading.

Stand 45: 9.6 acres

Site Description:

This stand is southeast facing and is a drainage area.

Stand Description:

This site is occupied by medium sized (12-18" dbh) silver maple, ash, shingle oak, cottonwood, a few white and bur oaks. The understory has bitternut hickory, hackberry, and elm in it.

Management Recommendations: Viewshed

A selective harvest could be done to remove some of the less desirable species, leaving more desirable species to repopulate the area.

Stand 46: 11.7 acres

Site Description:

This site is on a slight southeastern facing slope.

Stand Description:

Medium sized (12-18" dbh) white oak, bur oak, and shagbark hickory make up the overstory in this stand while the understory has hackberry, elm, cherry, and shagbark hickory.

Management Recommendations: Even age

This stand would benefit from crop tree release and then a shelterwood harvest in 20-25 years.

Stand 47: 4.4 acres

Site Description:

This is a bottomland that has a slight southeastern slope.

Stand Description:

Medium sized (12-18” dbh) shingle oak, bur oak, white oak, red oak, cottonwood and a few black walnut make up this stand. The understory has shingle oak, silver maple, and elm.

Management Recommendations: Even age

Removing some of the understory and a harvest of the less desirable species would help regenerate this stand.

Stand 48: 68.9 acres

Site Description:

This area is a poorly drained bottomland containing some major stream beds.

Stand Description:

Most of the trees are large sized (20”+ dbh) cottonwood, shingle oak, silver maple, and some honey locust. The understory has some elm, bitternut, and ash.

Management Recommendations: Viewshed

Weed tree removal can be done on this site to reduce the amount of undesirables such as honey locust.

Stand 49: 18.7 acres

Site Description:

This site is mainly a south east facing side slope.

Stand Description:

Cedar and a few scattered elm that are pole (5-10” dbh) sized and large shingle oaks make up most of this stand.

Management Recommendations: Viewshed

Park management plans call for converting this site to a native prairie.

Wildlife management recommendations:

The conversion of this stand to native prairie will be very beneficial to wildlife. Grassland and other ground nesting birds will be especially benefited. It is recommended that the seeding mixture consist of a large variety of forbs (18 or more) and at least 5 grasses. Typical short grass mixtures consisting of little bluestem, sideoats grama, Canada or Virginia rye, and prairie dropseed should be favored over tallgrass mixtures containing big bluestem and Indian grass.

Stand 50: 2.4 acres

Site Description:

This is a steep side slope that is northwest facing.

Stand Description:

This stand has some very nice large (20"+ dbh) white oak, red oak, black walnut, and black oak. The understory has ash, elm, and shagbark hickory.

Management Recommendations: Even age

A shelterwood harvest would benefit this stand since not a lot of oaks or walnuts are present to help regeneration. This harvest could be done in 10-15 years.

Stand 51: 2.2 acres

Site Description:

This site is a north facing side slope.

Stand Description:

Most of this stand is cedar that are pole sized (5-10" dbh) with a few scattered large shingle oaks.

Management Recommendations: Viewshed

This stand will be converted to prairie in the near future.

Stand 52: 3.4 acres

Site Description:

This site is a southeastern facing slope.

Stand Description:

Most of this stand is pole sized (5-10" dbh) Eastern Red Cedar with a few shingle oaks and elms.

Management Recommendations: Viewshed

This stand is good for wildlife.

Wildlife management recommendations:

If equipment access to this site is good, the establishment and maintenance of a green browse plot could be considered. A seed mixture containing legumes such as Ladino clover, alfalfa, red or white clover and a minimal amount of grass (timothy or red top) is preferred. Including oats, annual rye or winter wheat as a nurse crop will help hold the soil, as well as provide wildlife cover until the legumes become established. Maintain the plot by mowing in mid-summer.

Stand 53: 14.2 acres

Site Description:

This site is mainly bottomland area with two main drainage areas, mostly poorly drained.

Stand Description:

Most of the trees in this stand are large (20"+ dbh) cottonwood, shingle oak and some elms.

Management Recommendations: Viewshed

This stand could use a selective harvest to reduce the amount of less desired species. Planting may be required to produce a more desired stand.

Stand 54: 2.8 acres

Site Description:

This site is a south eastern facing slope.

Stand Description:

Most of the trees in this stand are pole (5-10" dbh) sized bur oak and shagbark hickory. In the understory are cherry, shingle oak, and hackberry with a few shingle oak regenerating on the edge.

Management Recommendations: Even age

This stand would benefit from crop tree release for the bur oak. Once the stand reaches maturity a shelterwood harvest would be the best option since not too many oaks surround the stand.

Stand 55: 2.1 acres

Site Description:

This stand is mostly southwest facing and is on a slight side slope.

Stand Description:

This stand is open grassland with some shingle oak and cedar moving on the edges.

Management Recommendations: Viewshed

This stand will be managed as a prairie in the near future.

Wildlife management recommendations:

This stand might be a good location to utilize prescribed fire as a management tool. If the site has remnant prairie plants, it's very likely that periodic fire will restore the prairie without the need of seeding.

Stand 56: 20.3 acres

Site Description:

This site is a south west facing side slope. A retention pond is planned to be installed here.

Stand Description:

Most of the trees are medium (12-18" dbh) bur oak, shingle oak, and a few white and red oaks. The understory is shingle oak, ash, shagbark hickory, and elm.

Management Recommendations: Even age

An understory thin would benefit this stands regeneration. In 40-50 years a shelterwood harvest could be done.

Stand 57: 4.3 acres

Site Description:
Most of this site is upland with a slight southwestern slope with a trail in the center.

Stand Description:
This stand is grasses with pole (5-10" dbh) sized cedar and shingle oak in spots, with some black locust on the edge.

Management Recommendations: Viewshed
This stand will be converted to prairie.

Wildlife management recommendations:
As with stand 55, this site could be a candidate for prairie restoration through the use of prescribed fire. Native seeds will remain in dormancy for many years waiting for the combination of fire and sunlight to break dormancy. Timely herbicide application can also be incorporated if a well established cool season grass component needs to be eliminated.

Stand 58: 48.3 acres

Site Description:
This site is a drainage area that is moderately sloped. Two retention ponds are planned to be installed here.

Stand Description:
The trees in this stand are medium (12-18" dbh) sized, with a lot of black locust, shingle oak, some black walnut and hackberry.

Management Recommendations: Viewshed
Weed tree removal should be done to remove the locust. Some crop tree release could follow as needed. A selective harvest could occur in 40-50 years.

Stand 59: 10.9 acres

Site Description:
Most of this stand is southwestern facing side slope. The site will include a retention pond.

Stand Description:
Ash, silver maple, shingle oak, and honey locust that are medium (12-18" dbh) sized make up the overstory with ash, elm, and some black locust making up the understory.

Management Recommendations: Viewshed

A weed tree removal to removal the black locust would be beneficial. In 40-50 years a selective harvest can be used to lower the amount ash in this stand.

Stand 60: .6 acres

Site Description:

This site is southwestern facing slight slope.

Stand Description:

This area has been cleared with some shingle oak are moving in on the edges.

Management Recommendations: Viewshed

This stand will be converted to prairie in the near future.

Stand 61: 1.5 acres

Site Description:

This site is southwestern facing slight slope.

Stand Description:

This area has been cleared with some shingle oak are moving in on the edges.

Management Recommendations: Viewshed

This stand will be converted to prairie in the near future.

Wildlife management recommendations summary:

Although there have been 61 forest stands identified by this plan, Lake Wapello State Park does not contain a great deal of wildlife habitat diversity. Stand mapping concluded that the Park currently consists of 293 acres of 5"-12", 316 acres of 14"-18" and 183 acres of > 20" trees. Implementation of the forest management prescriptions in this plan have the potential to greatly enhance the wildlife habitat within the Park. Both weed tree removal and timber stand improvement will provide an immediate benefit to the oak component of this ecosystem and will enhance the opportunity for oaks to regenerate. Not only are the acorns produced by oaks an important food source for several wildlife species, the oak forest itself provides shelter and nesting sites for numerous wildlife. The tree thinning prescribed in this plan can also greatly benefit wildlife. In most cases, Iowa's forests are overstocked, both from a timber production and wildlife habitat standpoint. Wildlife greatly benefit from sites that receive significant canopy reduction. A more open canopy allows sunlight to simulate the growth of native forbs on the forest floor. Although commonly misunderstand, the final stage of a shelterwood harvest is also a valuable management tool for wildlife.

The habitat most obviously lacking at the Park is early successional - being defined as grasslands or shrubby habitat. The establishment of native prairie plots will greatly help create early successional habitat and will yield nesting and brood rearing cover. The Park is encouraged to establish and maintain as much prairie as possible. Although not recommended in this forest stewardship plan, the restoration of oak savanna would also result in the development valuable wildlife habitat. Oak savannas were once common throughout Iowa and are today one of the most depleted of our natural ecosystems. Following the final harvest in a shelterwood system, the stage is set for the development of an early successional plant community. This type of habitat is much needed at the Park and will be quickly colonized by the many species of wildlife that utilize such a cover type. It's a good practice to have several scattered early successional habitat plots throughout a given area. If each plot is in a slightly different age of development, the needs of wildlife are continually being met.

Sustainable Forestry Guidelines

Sustainable forestry is managing a forest to maximize the distribution of age classes on the property, and insure there is a balanced distribution of trees sizes. With even age management, the acres of even age management divided by the rotation is the allowable cut per year. The target rotation age for the area is 125 years. This insures that large works will always be present on the area.

Even Age Management Area:
There are 465 acres of even age management; dividing 391 acres by 125 years would yield an allowable cut of 3.1 acres a year

Highest Priority Projects

Timber Stand Improvement – Crop Tree Release

Stand number	*Acres*
12	52.2
13	17.2
23	6.3
Total	75.7

Shelterwood Harvest – 125 year rotation

Stand Number	*Acres*	*Prescription*
19	22.9	Open stand to create regeneration of oak.
22	8.1	Planting may be required
43	48.3	Oaks are mature, some Oak Wilt in Stand
Total	79.3	

APPENDIX

SUMMARY OF STANDS

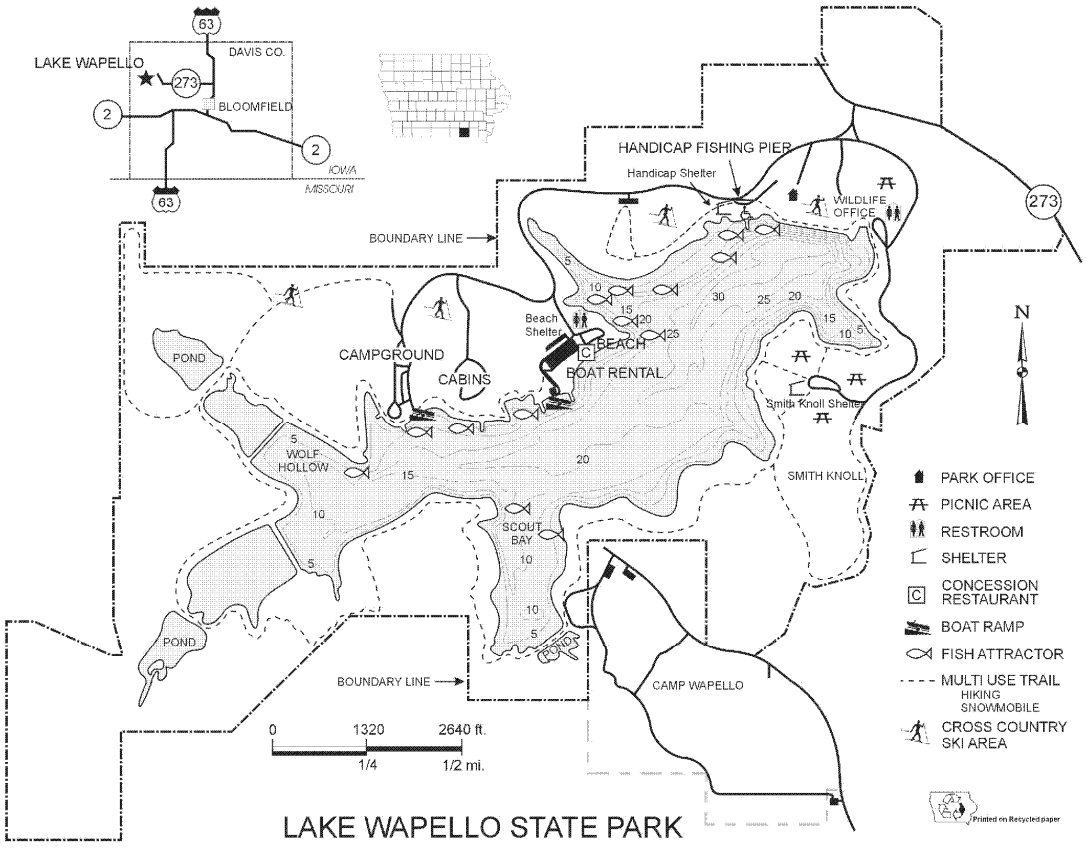
Lake Wapello State Park

Stand	Acres	Timber Type	Tree Size	Management System	Prescription	Priority
1	13.9756	Mixed Hardwoods	Medium	Even Age	Weed Tree Removal	Medium
2	82.9835	Mixed Oaks	Medium	Even Age	Understory Thin	Medium
3	8.8575	Mixed Oaks	Pole	Even Age	Crop Tree Release	Medium
4	2.7359	Cedar & White Pine	Pole	Viewshed		Low
5	2.7042	Hackberry Silver Maple	Pole	Viewshed		Low
6	2.3466	Cedar Mixed Oak	Pole	Viewshed		Low
7	14.2093	Black and Honey Locust Silver Maple	Medium	Viewshed		Low
8	1.0839	Mixed Oak Shagbark Hickory	Medium	Even Age	Understory Thin	Medium
9	5.2617	Locust/Oak	Medium	Viewshed		Low
10	6.9935	Mixed Oak Shagbark Hickory	Large	Even Age	Shelterwood Harvest	Medium
11	7.4682	Cottonwood Silver Maple	Medium	Even Age	Shelterwood Harvest	Medium
12	52.1555	Mixed Oaks	Pole	Even Age	Crop Tree Release	High
13	17.1835	Mixed Oaks	Pole	Even Age	Crop Tree Release	High
14	0.06516	n/a	N/A	Viewshed		Low
15	22.4479	Mixed Oaks	Pole	Even Age	Crop Tree Release	Medium
16	3.052	Bur Oak Shagbark Hickory	Pole	Viewshed	Basal Area Thin	Low
17	2.1304	Mixed Oaks	Medium	Even Age	Crop Tree	Low

					Release	
18	12.2271	Mixed Oaks	pole	Even Age	Crop Tree Release	Medium
19	22.9469	Mixed Oak Shagbark Hickory	Large	Even Age	Shelterwood Harvest	High
20	8.098	Cedar and White Pine	N/A	Viewshed		Low
21	6.6756	Mixed Oak Shagbark Hickory	Medium	Even Age	Understory Thin	Medium
22	8.1406	Mixed Oaks	Large	Even Age	Shelterwood Harvest	High
23	6.3297	Mixed Oak Shagbark Hickory	Pole	Even Age	Crop Tree Release	High
24	8.4144	Mixed Oaks	Large	Even Age	Shelterwood Harvest	Medium
25	24.1784	Locust Ash and Hackberry	Medium	Viewshed		Low
26	6.2764	Mixed Oak Hackberry	Pole	Even Age	Crop Tree Release	Medium
27	13.4546	Mixed Oak Locust Hackberry	Pole	Viewshed		Low
28	25.1328	Locust Cedar and a few Bur Oak	Pole	Viewshed		Low
29	2.2427	Cedar Ash Locust	Pole	Viewshed		Low
30	2.1293	Walnut Cottonwood Hackberry Bur Oak	Medium	Viewshed		Low
31	4.6989	Mixed Oak Shagbark Hickory	Pole	Even Age	Crop Tree Release	Medium
32	3.1474	Cedar Shingle Oak	Pole	Viewshed		Low
33	4.4108	Walnut Shingle Oak Ash	Medium	Even Age	Crop Tree Release	Medium
34	0.7683	Walnut Scattered	Pole	Viewshed		Low

		Oak				
35	5.1384	Locust Walnut Ash	Medium	Viewshed		Low
36	21.1111	Ash Locust	Medium	Viewshed		Low
37	11.0563	Silver Maple Oaks	Medium	Viewshed		Low
38	10.7419	Hackberry Shingle Oak	Pole	Viewshed		Low
39	3.4937	Sycamore Bitternut Hickory	Large	Viewshed		Low
40	3.6782	Shingle Oak Locust	Medium	Viewshed		Low
41	6.6847	Basswood Walnut Ash	Medium	Even Age	Crop Tree Release	Medium
42	26.6289	Cedar Cherry Locust	Pole	Viewshed		Low
43	48.2624	Mixed Oak Shagbark Hickory	Large	Viewshed		Low
44	36.4036	Locust Mixed Oak	Pole	Viewshed		Low
45	9.6195	Silver Maple Oaks	Medium	Viewshed		Low
46	11.7532	White Oak Walnut Shagbark Hickory	Medium	Viewshed		Low
47	4.3684	Mixed Oaks	Medium	Even Age	Crop Tree Release	Medium
48	68.9576	Cottonwood Silver Maple	Large	Viewshed		Low
49	18.7098	Cedar	Pole	Viewshed		Low
50	2.4227	Walnut mixed Oaks	Large	Even Age	Shelterwood Harvest	Medium
51	2.1993	Cedar	Pole	Viewshed		Low
52	33.9460	Cedar	Pole	Viewshed		Low
53	14.2195	Cottonwood Silver Maple	Large	Viewshed		Low
54	2.844	Bur Oak Shagbark Hickory	Pole	Even Age	Crop Tree Release	Medium
55	2.1397		N/A	Viewshed		Low

56	20.3193	Bur Oak Shagbark Hickory	Medium	Even Age	Understory Thin	Medium
57	4.3083	Cedar	Pole	Viewshed		Low
58	48.2624	Locust Shingle Oak	Medium	Viewshed		Low
59	10.9536	Silver Maple Ash	Medium	Viewshed		Low
60	0.6		N/A	Viewshed		Low
61	1.5		N/A	Viewshed		Low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DAVIS CO.
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BLOOMFIELD
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IOWA
MISSOURI
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HANDICAP FISHING PIER
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WILDLIFE OFFICE
273
BOUNDARY LINE
Beach Shelter
BEACH
BOAT RENTAL
CAMPGROUND
CABINS
POND
WOLF HOLLOW
SCOUT BAY
POND
POND
Smith Knoll Shelter
SMITH KNOLL
BOUNDARY LINE
CAMP WAPELLO
N
PARK OFFICE
PICNIC AREA
RESTROOM
SHELTER
CONCESSION RESTAURANT
BOAT RAMP
FISH ATTRACTOR
MULTI USE TRAIL
HIKING
SNOWMOBILE
CROSS COUNTRY SKI AREA
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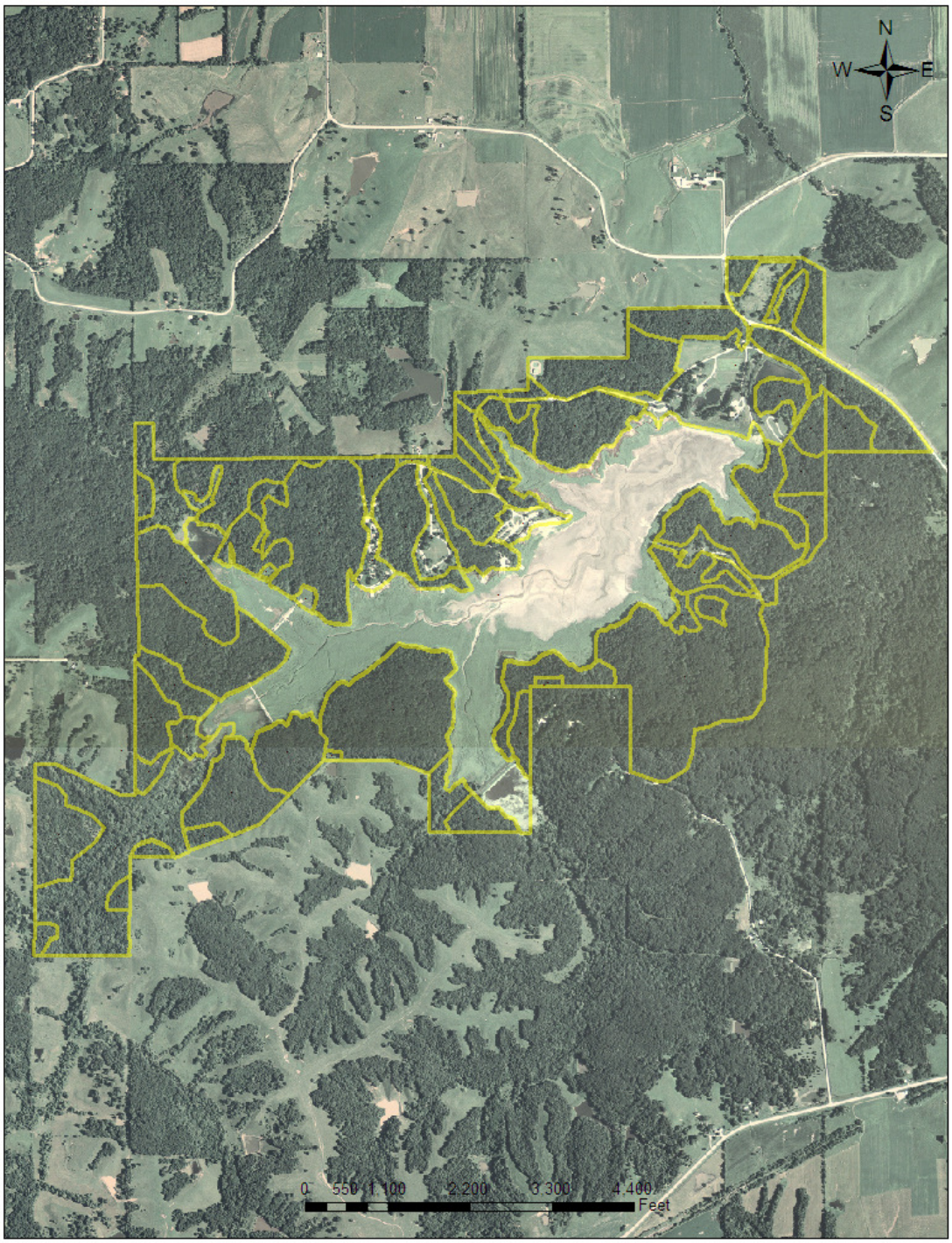
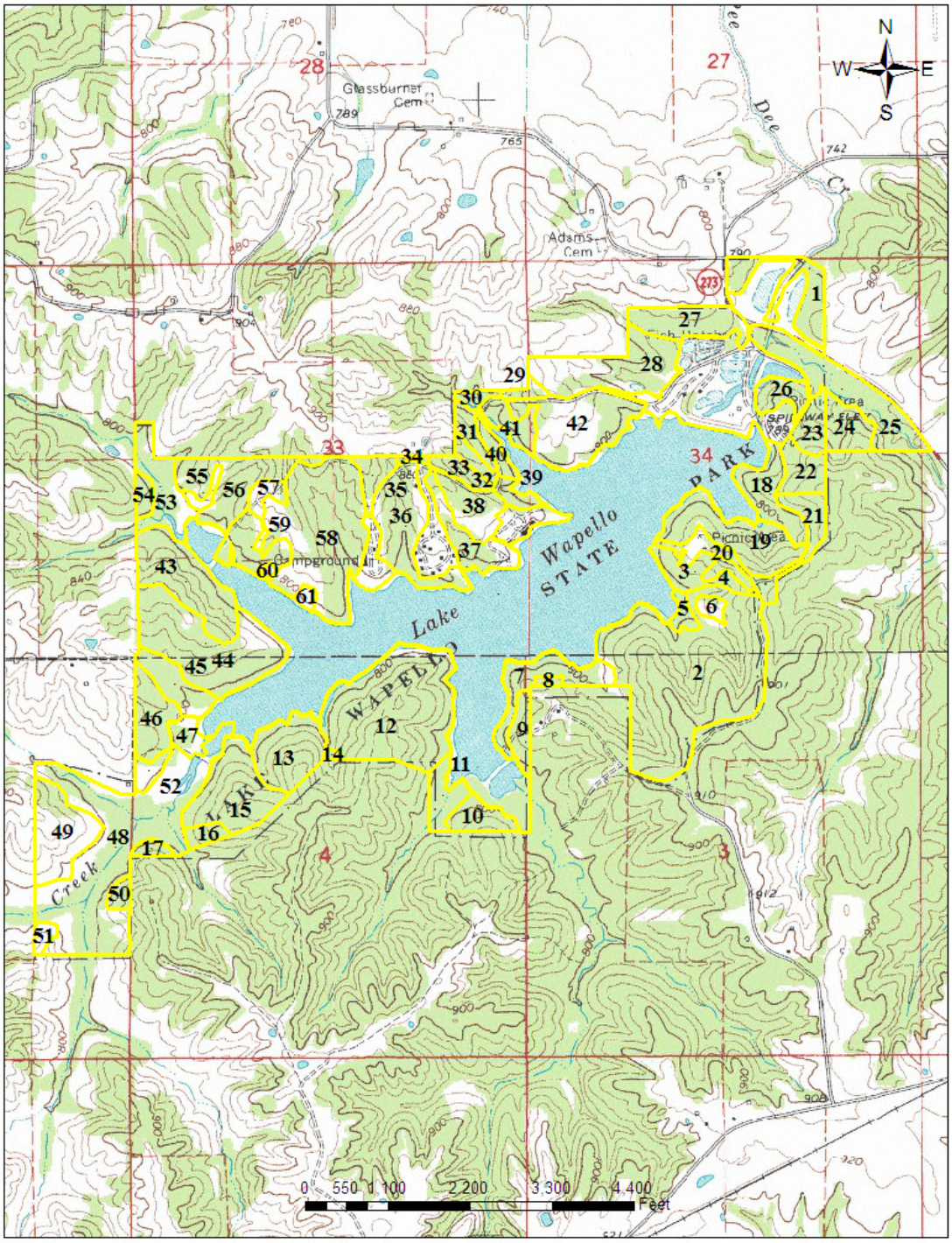
1/4
1/2 mi.
Printed on Recycled paper
LAKE WAPELLO STATE PARK

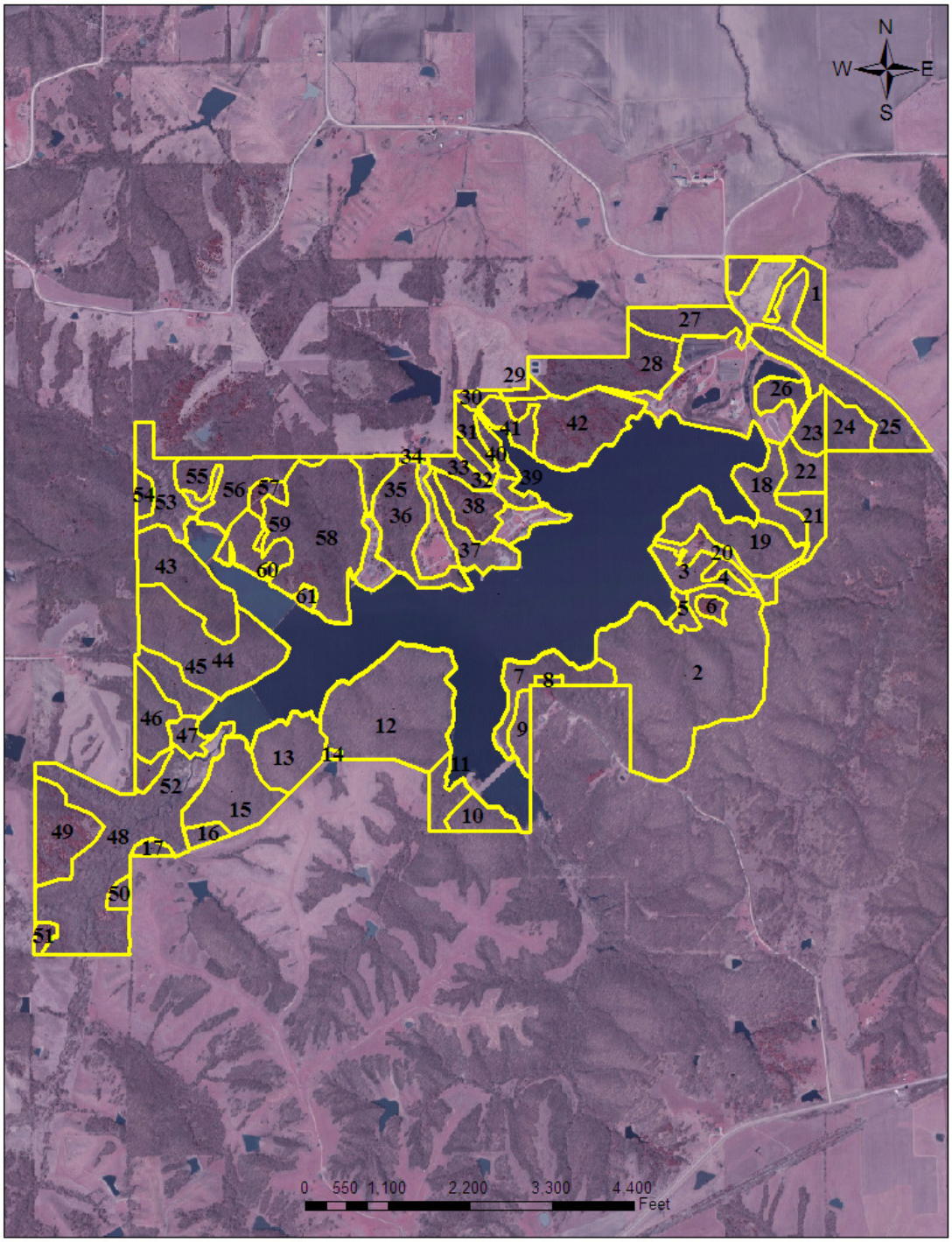
2008 Aerial Photo of Lake Wapello State Park



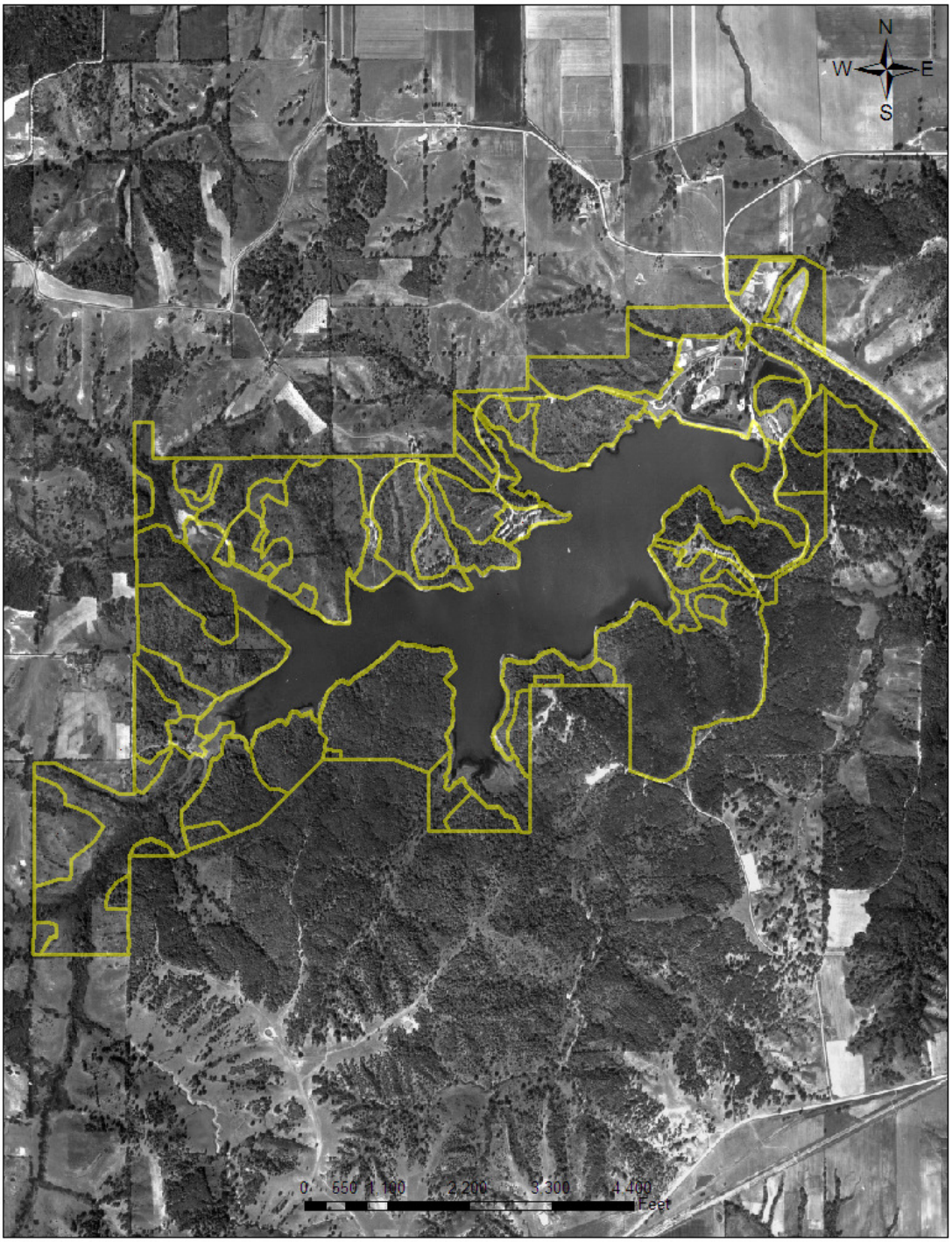
2008 photo with stand boundaries



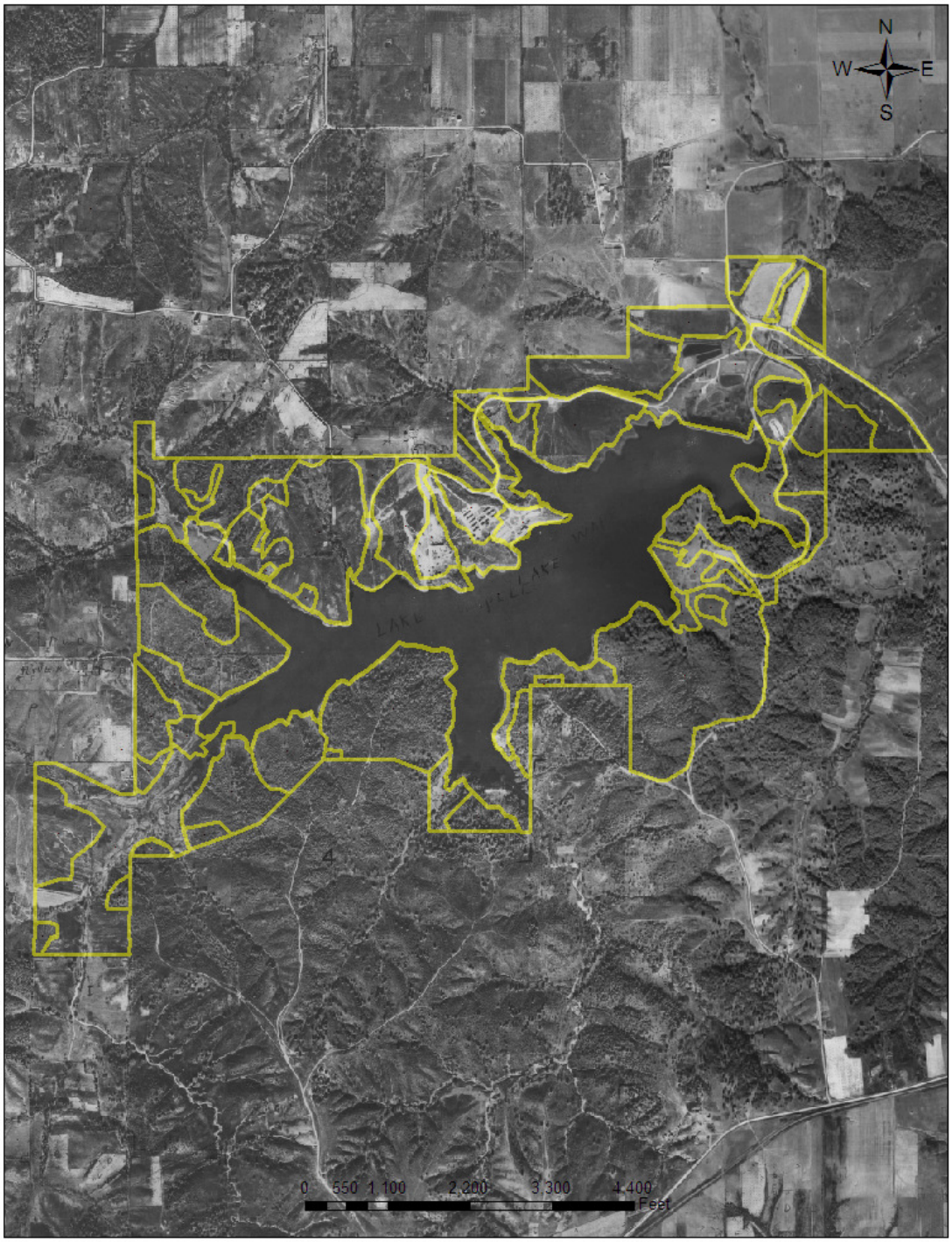
USGS Topography map of the park



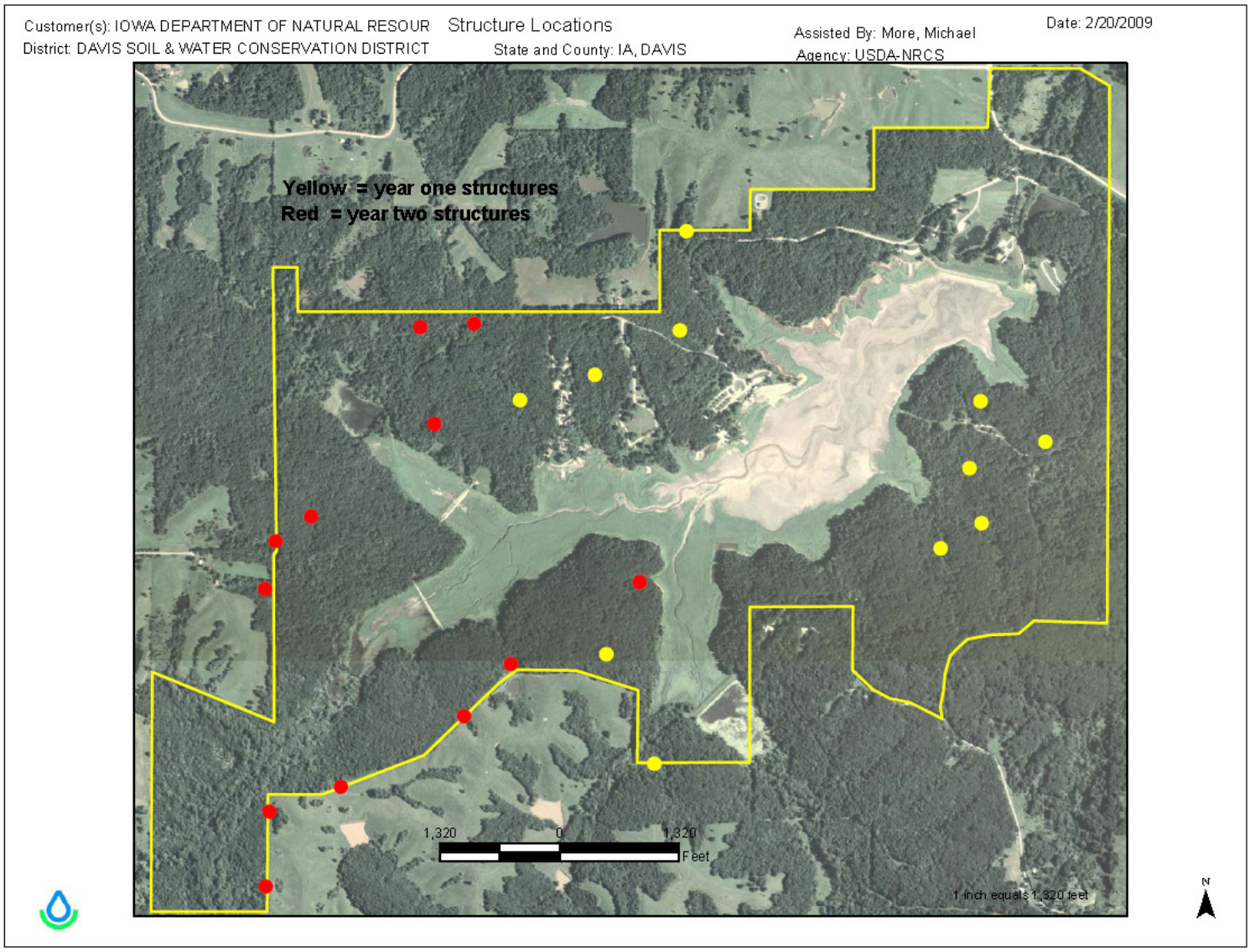
2002 Aerial photo of park with stand numbers



1950's Aerial photo of park



1930's Aerial Photo of Park



Structure locations for 2009 and 2010
(Natural Resource and Conservation Service 2009)

Threatened and Endangered Species by County

The following is a list of species that are state and / or federally listed as threatened or endangered. These species have been recorded / surveyed to be found in the corresponding county. Lists taken from Iowa DNR Natural Areas Inventory webpage.

Summary by Species Report

Total Unique Listed Species In This County: 21

County	Common Name	Scientific Name	Class	State Status	Federal Status
DAVIS	Bald Eagle	Haliaeetus leucocephalus	BIRDS	E	
DAVIS	Henslow's Sparrow	Ammodramus henslowii	BIRDS	T	
DAVIS	Orangethroat Darter	Etheostoma spectabile	FISH	T	
DAVIS	Indiana Bat	Myotis sodalis	MAMMALS	E	E
DAVIS	Southern Bog Lemming	Synaptomys cooperi	MAMMALS	T	
DAVIS	Bent Milk-vetch	Astragalus distortus	PLANTS (DICOTS)	S	
DAVIS	Downy Woodmint	Blephilia ciliata	PLANTS (DICOTS)	T	
DAVIS	Earleaf Foxglove	Tomanthera auriculata	PLANTS (DICOTS)	S	
DAVIS	False Loosestrife	Ludwigia peploides	PLANTS (DICOTS)	S	
DAVIS	Lance-leaf Ragweed	Ambrosia bidentata	PLANTS (DICOTS)	S	
DAVIS	Prairie-tea	Croton monanthogynus	PLANTS (DICOTS)	S	
DAVIS	Waxweed	Cuphea viscosissima	PLANTS (DICOTS)	S	
DAVIS	Winged Monkey Flower	Mimulus alatus	PLANTS (DICOTS)	T	
DAVIS	Broom Sedge	Andropogon virginicus	PLANTS (MONOCOTS)	S	
DAVIS	Bush's Sedge	Carex bushii	PLANTS (MONOCOTS)	S	
DAVIS	False Hellebore	Veratrum woodii	PLANTS (MONOCOTS)	T	
DAVIS	Meadow Bluegrass	Poa wolfii	PLANTS (MONOCOTS)	S	
DAVIS	Slender Ladies'-tresses	Spiranthes lacera	PLANTS (MONOCOTS)	T	
DAVIS	Copperhead	Agkistrodon contortrix	REPTILES	E	
DAVIS	Slender Glass Lizard	Ophisaurus attenuatus	REPTILES	T	
DAVIS	Speckled Kingsnake	Lampropeltis getulus	REPTILES	T	

Glossary

Acre: An area of land containing 43,560 square feet. A *forty* of land contains 40 acres and a *section* of land contains 640 acres.

Annual ring: Trees in climates where growths stops or slows during portion of the year will form annual rings which can be read to determine tree age and growth rate. Annual rings are highly visible in species that form less dense wood during favorable growing conditions early in the season and denser wood less favorable conditions later in the year. In some tree species this differentiation does not occur and annual rings are difficult to see. In tropical species growth never, or seldom, ceases and annual rings may not be apparent.

Bark: The outer layer of the stems, limbs and twigs of woody plants. Often bark is characteristic of the species and can be used for identification.

Basal area: The cross-sectional area of the base of any object. In forestry, it is the cross sectional area of a tree at 4.5 feet above the ground, expressed in square feet. The sum of all the trees on an acre is a measure of the density of the trees growing on the acre and is useful for making forest management decisions. Basal area can be calculated from tree diameter or can be easily measured with an angle gauge when certain relationships are known. Basal area will commonly range from 20 to 70 square feet per acre for poorly stocked stands to more than 200 square feet per acre for dense stands of conifers.

Biodiversity (biological diversity): The variety and abundance of species, their genetic composition and the communities and landscapes in which they occur, including the ecological structures, functions and processes occurring at all of those levels.

Board foot: A unit of measure of wood 1" thick and 1 foot on each side equaling 1/12 cubic foot of wood.

Bole: The stem or trunk of a tree; usually thought of as being that part without limbs- the merchantable part of the stem.

Clearcut: A method of regenerating a forest in which all trees on a given area are cut.
Clearcutting results in conditions which allow the greatest amount of sunlight to reach the forest floor, a desirable condition for the regrowth of certain valuable tree species which need a lot of sunlight to grow, such as oak and walnut. Clearcutting also can create certain benefits for wildlife.

Competition: The struggle between trees to obtain sunlight, nutrients, water and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Conversion: A change though forest management from one tree species or association to another within a forest stand or site.

Cover type: Expressed as the tree species having the greatest representation in a forest stand. A stand where the major species is oak would be called an oak cover type.

Crop: The vegetation growing on a forest area, more particularly the major woody growth having commercial value.

Crop tree release: Crop tree release is the practice of selecting the individual trees that are to remain in the stand until maturity and then removing the trees competing with them. Crop trees could be selected on the basis of any of the values associated with trees such as aesthetics, wildlife or economic values. Selected trees should be straight with long, clear boles, dominant or co-dominant and should be the trees bringing the best returns upon maturity.

Crown: Refers to that part of the tree consisting of limbs, branches, twigs and leaves.

Cruise: A survey of forest land to identify timber and estimate its species composition, products, size, quality or other characteristics.

Cull: Refers to a tree having no commercial value, usually from having rot, holes, large knots or being crooked. It is important to note that a cull, though having no commercial value, may have wildlife, aesthetic or other values.

Cultural practice: The manipulation of vegetation to meet objectives of controlling stand composition or structure such as site improvement, forest stand improvement, increased regeneration, increased growth or insect and disease control measures.

D.B.H.: Stands for Diameter at Breast Height. Always taken at 4.5 feet above the ground.

Den tree: A tree that has a hole in its stem that can be used as shelter by wildlife.

Disturbance: Any event, either natural or human induced, that alters the structure, composition or functions of an ecosystem. Examples include forest fires, insect infestations, windstorms and timber harvesting.

Dominant (trees): Individuals or species of the upper layer of the forest canopy.

Early successional forest: The forest community that develops immediately following the removal or destruction of vegetation in an area. Plant succession is the progression of plants from bare ground (e.g.,

after a forest fire or timber harvest) to mature forest. Succession consists of a gradual change of plant and animal communities over time. Early succession forests commonly depend on and develop first following disturbance events. Each stage of succession provides different benefits for a variety of species.
Endangered species: A plant or animal species that is threatened with extinction throughout all, or a significant portion, of its native range.
Even-aged stand: A stand of trees composed of a single age class.
Forest: A forest is an ecosystem, an association of plants and animals. Trees are its dominant feature. They provide many benefits including habitat, water quality improvement, recreation, climatic amelioration and wood products. The plants and animals that make up a forest are interdependent and often essential to its integrity.
Forester: A professional engaged in the science and profession of forestry; foresters are commonly accredited by states or other certifying bodies (e.g., the Society of American Foresters) and may be licensed, certified or registered indicating specific education and abilities.
Forest cover: All trees and other plants occupying the space in a forest, including any ground cover.
Forest fire: An uncontrolled fire on lands covered wholly or in part by timber, brush, grass, grain or other flammable vegetation.
Forest floor: The accumulated organic matter at the soil surface, including litter and unincorporated humus.
Forest inventory: A set of objective sampling methods designed to quantify the spatial distribution, composition and rates of change of forest parameters within specified levels of precision for the purposes of management.
Forest management: The practical application of biological, physical, quantitative, managerial, economic, social and policy principles to the regeneration, management, utilization and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest. Forest management includes management for aesthetics, fish, recreation, urban values, water, wilderness, wildlife, wood products and other forest resource values.
Forest stand: A stand may loosely be defined as a contiguous group of trees sufficiently uniform in species composition, arrangement of age classes and general condition to be a homogeneous and distinguishable unit. A stand is usually treated as a basic silvicultural unit, but it seldom represents a natural ecological unit. Its composition and structure are most strongly affected by management, other disturbances and chance factors affecting seed distribution, germination and seedling survival.
Forest Stand Improvement (FSI): A practice in which the quality of a residual forest stand is improved by removing less desirable trees to achieve the desired stocking of the best quality trees or to improve the reproduction, composition, structure, condition and / or volume growth of a stand.
Fully-stocked stand: A forest stand in which all growing space is effectively occupied but having ample space for development of crop trees.
Game species: Game species include those terrestrial species that are hunted and trapped.
Geographic Information System (GIS): Computer software used to manipulate, analyze and visually display inventory and other data.
Group selection: A process of harvesting patches of selected trees to create openings in the forest canopy and to encourage reproduction of uneven-aged stands.
Hardwood: Hardwoods are generally defined as the woods of deciduous trees (i.e., trees which shed their leaves in the winter).
Landform: Any physical, recognizable form or feature of the earth's surface having a characteristic shape and produced by natural causes. Examples of major landforms are plains, plateaus and mountains. Examples of minor landforms are ills, valleys, slopes, eskers and dunes. Together, landforms make up the surface configuration of the earth.
Landscape: A general term referring to geographic areas that are usually based on some sort of natural feature or combination of natural features. They can range in scale from very large to very small.
Leave trees: Live trees selected to remain on a site to provide present and future benefits, such as shelter, resting sites, cavities, perches, nest sites, foraging sites, mast and coarse woody debris.
Management goals: Overall purpose for managing the composition and structure of forest land. For example: to protect land from erosion, to maintain wildlife habitat, to control insect and disease outbreaks, etc.
Management objectives: Defined conditions for the property, or segments of property (e.g. stands or management units), that will achieve management goals.

Management plan: A plan outlining the objectives for individual management units and describing steps for achieving them. Silvicultural procedures are identified in broad terms, but detailed prescriptions are developed in the field.
Mast: Nuts, seeds, catkins, flower buds and fruits of woody plants that provide food for wildlife.
Mature tree: A tree that has reached the desired size or age for its intended use. Size or age will vary considerably depending on the species, intended uses and site conditions.
Merchantable timber: Trees or stands having the size, quality and condition suitable for marketing under a given economic condition.
Multiple use: Using and managing a forested area to provide more than one benefit simultaneously. Common uses may include wildlife, timber, recreation and improvement of water quality.
Native plant community: A group of native plants that interact with each other and with its environment in ways not greatly altered by modern human activity or by introduced organisms. Native plants communities are classified and described by physiognomy, hydrology, landforms, soils and natural disturbance regimes (e.g., wild fires, wind storms, normal flood cycles).
Natural disturbances: Disruption of existing conditions by natural events such as wildfires, windstorms, droughts, flooding, insects and disease.
Natural regeneration: The growth of new trees from one of the following ways: (a) seeds naturally dropped from trees or carried by wind or animals, (b) seeds stored on the forest floor or (c) stumps that sprout or roots that sucker.
Non-forest land: Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses such as crops, pasture, residential areas, city parks, improved roads and power line clearings.
Non-game species: Non-game species include amphibians, reptiles, and those mammal and bird species that are not hunted or trapped.
Old-growth forests: Forests defined by age, structural characteristics and relative lack of human disturbance. These forests are essentially free from catastrophic disturbances, contain old trees (generally over 120 years old), large snags and downed trees.
Overstory: The canopy in a stand of trees.
Plantation: A stand composed primarily of trees established by planting or artificial seeding.
Pole or pole timber: A young tree or stand of young trees between 3.5 inches and 12.9 inches dbh.
Prairie: An extensive tract of level or rolling land that was originally treeless and grass covered. A prairie is generally characterized by deep fertile soil and regular disturbance, usually by fire.
Prescribed burn: To deliberately burn wild lands in either their natural or their modified state under specified environmental conditions, which allows the fire to be confined to a predetermine area and produces the intensity and spread required to attain planned resource management objectives.
Pruning: The practice of removing tree limbs so that a straight bole, free of limbs, will develop. Pruning can be a component of FSI.
Recreation: Leisure activities involving the enjoyment and use of natural resources.
Recreation facility: The improvements within a developed recreation site offered for visitor's enjoyment.
Regeneration: The act of renewing tree cover by establishing generation usually maintaining the same forest type forest that was removed. Regeneration may be artificial (direct seeding or planting) or natural (natural seeding or planting).
Release (release operation): A treatment designed to free young trees from undesirable, usually over-topping, competing vegetation.
Restoration: A new planting of seedlings, direct seeding or regeneration of roots. This creates new habitat that will be of higher quality for wildlife.
Riparian: Related to, living or located in conjunction with a wetland, river, stream or lake.
Riparian buffer: Woodland next to streams, lakes and wetlands that are managed to enhance and protect aquatic resources. Buffers provide woody cover that will enhance soil and water conservation while providing wildlife habitat.
Rotation age: The period of years between when a forest stand is established and when it receives its final harvest. This time period is an administrative decision based on economics, site conditions, growth rates and other factors.
Salvage cut: A harvest made to remove trees killed or damaged by fire, wind, insects, disease, or other agents. The purpose of salvage cuts is to use available wood fiber before further deterioration occurs to recover value that otherwise would be lost.

Sanitation cut: A cutting made to remove trees killed or injured by fire, insects, disease or other injurious agents (and sometimes trees susceptible to such injuries).
Sapling: A young tree larger than a seeding but smaller than a pole (dbh < 3.5 inches).
Sapwood: The wood found closest to the bark or outside of the bole and usually distinguished from heart wood by being lighter in color.
Saw log: A log large enough to produce lumber or other products that can be sawed. Its size and quality vary with the utilization practices of the region.
Sawtimber: Trees that yield logs suitable in size and quality for the production of lumber.
Scarify: To break up the forest floor and topsoil preparatory to natural regeneration or direct seeding.
Seedling: A baby plant. In forestry the term usually used to refer to young trees that have grown beyond the stage where they have just emerged from the soil up to the point that they become saplings.
Seed tree: Any tree that bears seed; specifically, a tree left standing to provide the seed for natural regeneration.
Seed tree method: The harvest of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class. Seed trees are usually removed after regeneration is established.
Selective harvest: Removal of single scattered trees or small groups of trees at relatively short intervals. The continuous establishment of reproduction is encouraged and an all-aged stand is maintained. A management option used for shade-tolerant species.
Shade tolerance: Relative ability of a tree species to reproduce and grow under shade. The capacity to withstand low-light intensities caused by shading from surrounding vegetation.
Shelterwood: A method of regenerating a forest whereby a portion of the stand is harvested and the rest of the stand is evenly distributed over the area to protect the site and provide seed to regenerate the area. After the new stand is well established, the residual trees are harvested. This method is used to regenerate shade intolerant species.
Shelterwood harvest: A harvest cutting in which trees in the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.
Silvics: The study of the life history and general characteristics of forest trees and stands, with particular reference to environmental factors, as basis for the practice of silviculture.
Silviculture: The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.
Silvicultural prescription: Specific steps prescribed to achieve specific management objectives.
Single tree selection: Individual trees of all sizes classes are removed more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration; synonym: individual tree selection.
Site index: A measure of the productive quality of an area where trees grow. Site index is based on the height of dominant and co-dominate trees at age 50. That is to say, if the average height of dominant and co-dominate trees on a site was 70 feet at age 50, 70 would be the site index. Graphs are developed to enable determination of site index over a range of tree ages.
Site potential: Collective physical resources (e.g., soil moisture, nutrients, light, heat) available for plant growth. Different potentials facilitate growth of some species and limit growth of others. Consequently, site potential has a strong effect on plant community development.
Slash: The non-utilized and generally unmarketable accumulation of woody material in the forest, such as limbs, tops, cull logs and stumps that remain in the forest as residue after timber harvesting.
Snag: A snag tree is a dead tree; commonly a tall, limbless tree. Though of little or no commercial value, they are a very valuable wildlife resource.
Softwood: Generally considered to be the wood of conifers.
Stand: A contiguous group of trees similar in age, species composition, structure and growing on a site of similar quality. One stand will usually have characteristics that will distinguish it from other stands. Differences could include species, average diameter, density and location.
Succession: The natural replacement, over time, of one plant community with another.
Sucker: A shoot rising from below ground level from a root.
Suppressed: The condition of a tree characterized by low growth rate and low vigor due to competition from overtopping trees or shrubs.

Sustainability: Protecting and restoring he natural environment while enhancing economic opportunity and community well-being. Sustainability addresses three related elements: the environment, the economy and the community. The goal is to maintain all three elements in a healthy state indefinitely. Meeting the needs of the present without compromising the ability of future generations to meet their needs.
Thinning: A silvicultural treatment made to reduce the density of trees within a forest stand; primarily used to improve growth, enhance forest health or recover potential mortality. *Row thinning* is where selected rows are harvested, usually the first thinning, which provides equipment operating room for future selective thinning. *Selective thinning* is where individual trees are marked or specified (e.g., by diameter, spacing, or quality) for harvest. *Commercial thinning* is thinning after the trees are of merchantable size for timber markets. *Pre-commercial thinning* is done before the trees reach merchantable size, usually done in overstocked stands to provide more growing space for crop trees.
Threatened species: A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its native range.
Tolerance (shade tolerance): A plant's ability to tolerate conditions under a forest canopy.
Normally thought of as tolerance to low light conditions, but other understory conditions, such as root competition for water and nutrients, are also factors.
Two-aged stand: A stand with trees of two distinct age class separated in age by more than 20 percent of the rotation age.
Under plant: The planting of seedlings under an existing canopy or overstory.
Under-stocked: A stand of trees so widely spaced that even with full growth potential realized, crown closure will not occur.
Understory: The shorter vegetation (shrubs, seedlings, saplings, small trees) within a forest stand that forms a layer between the overstory and the herbaceous plants of the forest floor.
Uneven-aged stand: A stand with trees of three or more distinct age classes, either mixed or in small groups.
Uneven-aged management: A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Uneven-aged (selection) methods will maintain a multi-aged structure by removing some trees in all sizes classes either singly, in small groups or in strips: synonym: all-aged method.
Viewshed: A physiographic area composed of land, water biotic and cultural elements which may be viewed from one or more viewpoints and which has inherent scenic qualities and/ or aesthetic values as determined by those who view it. Viewsheds are a habitat factor that will be primarily a "hands-off" area for aesthetics and proper soil and water conservation, along with providing special wildlife values.
Volume: Refers to the amount of wood in a tree or log. Expressed as board feet, cords or other measures.
Well-stocked: The situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.
Wolf tree: A generally predominant tree with a broad, spreading crown that occupies more growing space than its neighbors.
Woodland: A plant community in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth, and forming an open canopy with intervening area occupied by lower vegetation, commonly grass.
Woodland edge: An area of habitat transition that consists of vegetation (herbaceous and woody) of different heights and densities. Edge can favor early successional wildlife species.